



NCVHS Subcommittee on Standards and Security

Washington, DC
August 19, 2003

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Vice President of Content Development

Cerner Multum





Discussion Points

- **Cerner's Position Regarding Drug Terminology Standardization**
- **Introduction to Multum**
- **Brief Description of the Multum Lexicon**
- **Response to the NCVHS Questionnaire**
 - Concept permanence
- **Proposal to the Subcommittee/FDA**



Cerner's Position Regarding Drug Standardization

- **We fully endorse Federal initiatives to standardize drug terminology**
 - It's good for the safety of the public.
 - It's good for our clients.
 - It's good for business.
- **We believe FDA should have the primary responsibility for standardizing drug terminology (but has neglected this responsibility historically)**
- **We believe the 13 “desirata” for drug terminologies we presented to this committee in 1998 should be incorporated into any Federal initiative**
- **We are prepared to contribute our intellectual property and resources to FDA (or other appropriate agency) under a proposal to be presented later in this discussion**

Multum Overview

- **Founded 1992**
- **Mission to reduce medication errors by delivering patient-specific drug information at the point of care**
- **Early emphasis on patient-specific dosing and clinical drug information**
- **Product suite expanded to include a wide array of drug information including an extensive concept-based drug vocabulary system in (~1995)**
- **Acquired by Cerner Corporation, 1998**
- **Continues as a wholly-owned clinical knowledge subsidiary, based in Denver, CO**





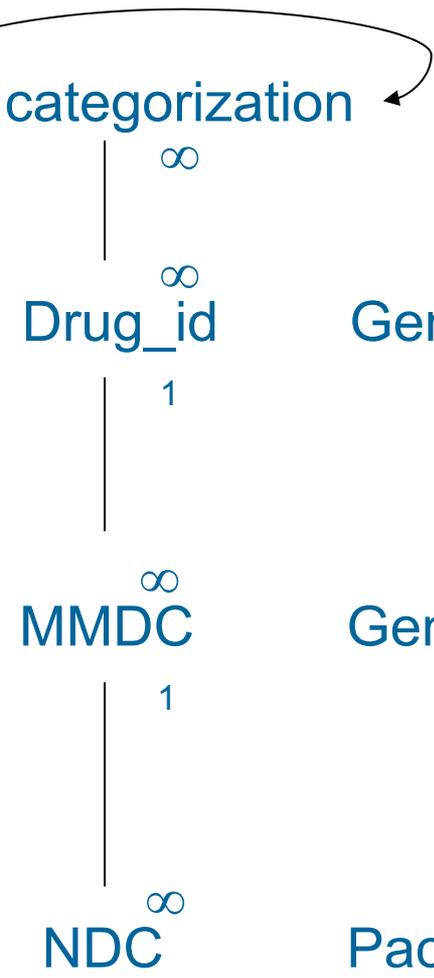
Multum Products/Solutions

- **Multum Lexicon**
 - **VantageRx Database**
 - **Vantage Rx (SDK)**
 - **addVantageRx (SDK)**
 - **MediSource Desktop Reference**
 - **MediSource Foundation**
 - **MediSource Advanced**
 - **MediSource Patient Specific**
 - **SubscribeRx**
- Relevant to Today's Discussion

(NB: Canadian products not listed)



Lexical Foundation



Generic drug concept

amoxicillin, ibuprofen,
ceftazidime, propoxyphene

Generic formulation concept

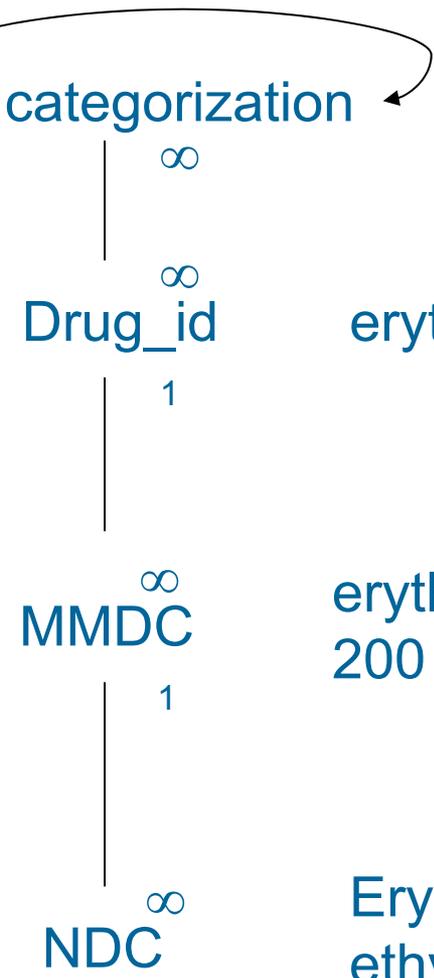
amoxicillin 500 mg oral capsule,
ceftazidime 1 gm/50ml IV solutio

Packaged drug product

Amoxil (amoxicillin) 500 mg oral
capsule, bottle of 30, non
unit-dosed, from SKB



Lexical Foundation



Concepts

erythromycin
 erythromycin ethylsuccinate
 200 mg oral table, chewable
 EryPed (erythromycin
 ethylsuccinate) 200 mg oral tablet,
 chewable bottle of 40, Southwood

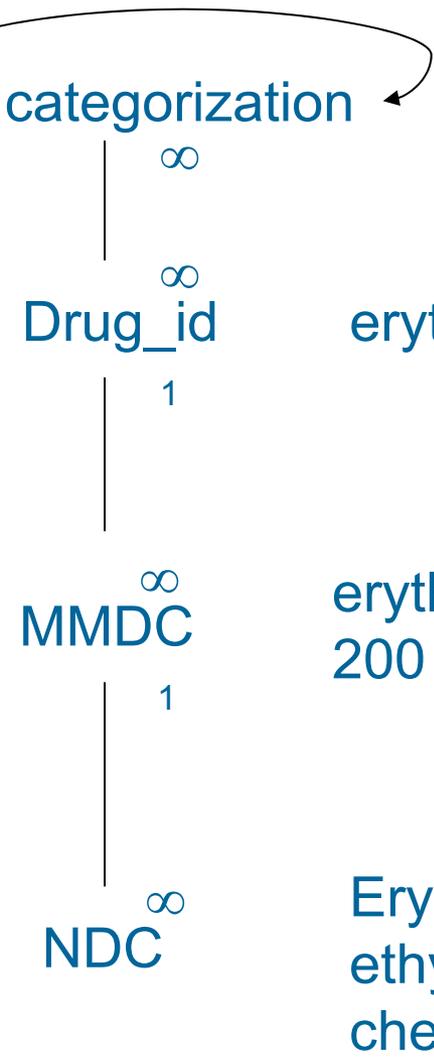
Names

drug_name (synonym_id)
erythromycin
erythromycin ethylsuccinate
Erythromycin Ethylsuccinate
erythromycin lactobionate
erythromycin ethylsuccinate 200 mg oral tablet, chewable
Erythromycin ES
Erythromycin Base
EryPed
gentamicin





Lexical Foundation



erythromycin

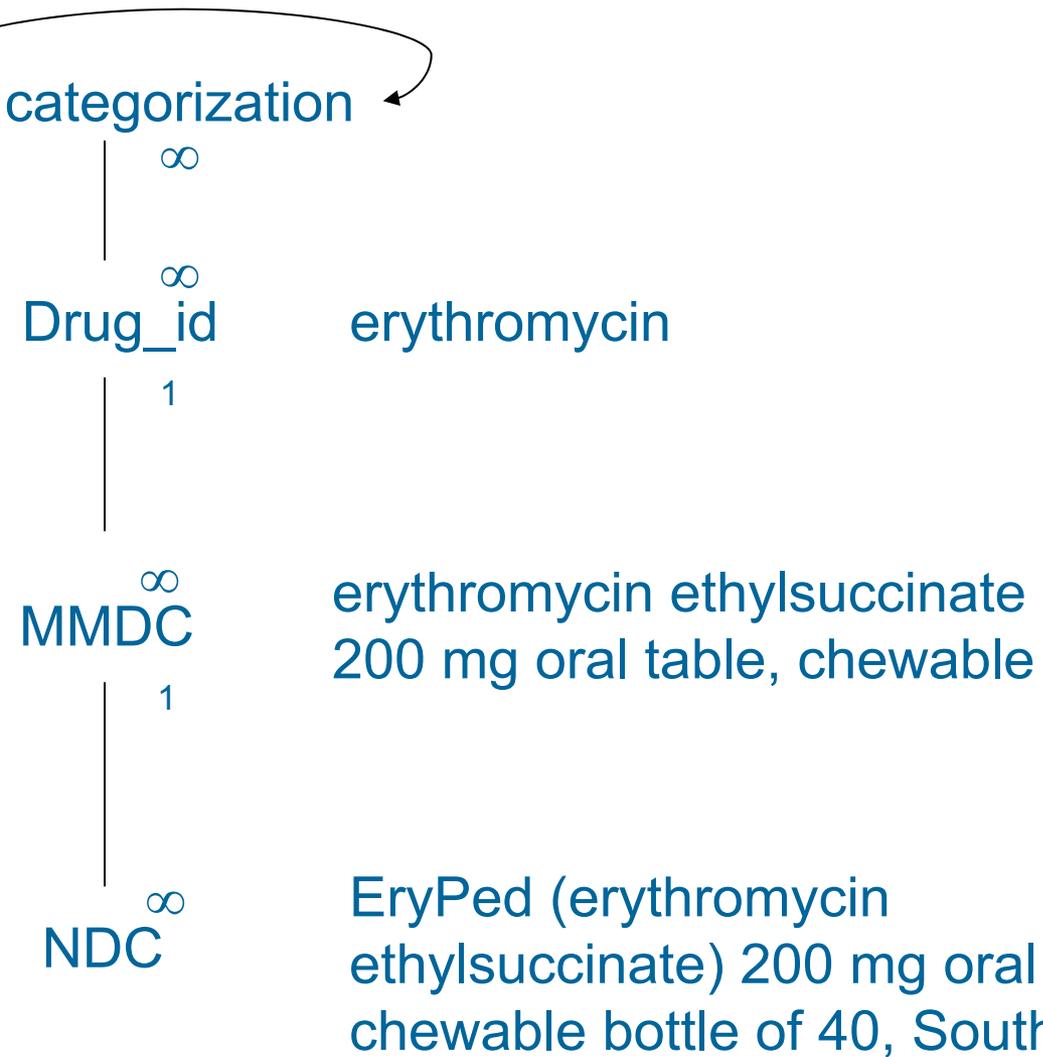
erythromycin ethylsuccinate
200 mg oral table, chewable

EryPed (erythromycin
ethylsuccinate) 200 mg oral tablet,
chewable bottle of 40, Southwood

- advanced dosing
- interactions
- allergies
- pharmacology
- side effects
- pregnancy
- lactation
- tx duplication
- flat text dosage
- etc....



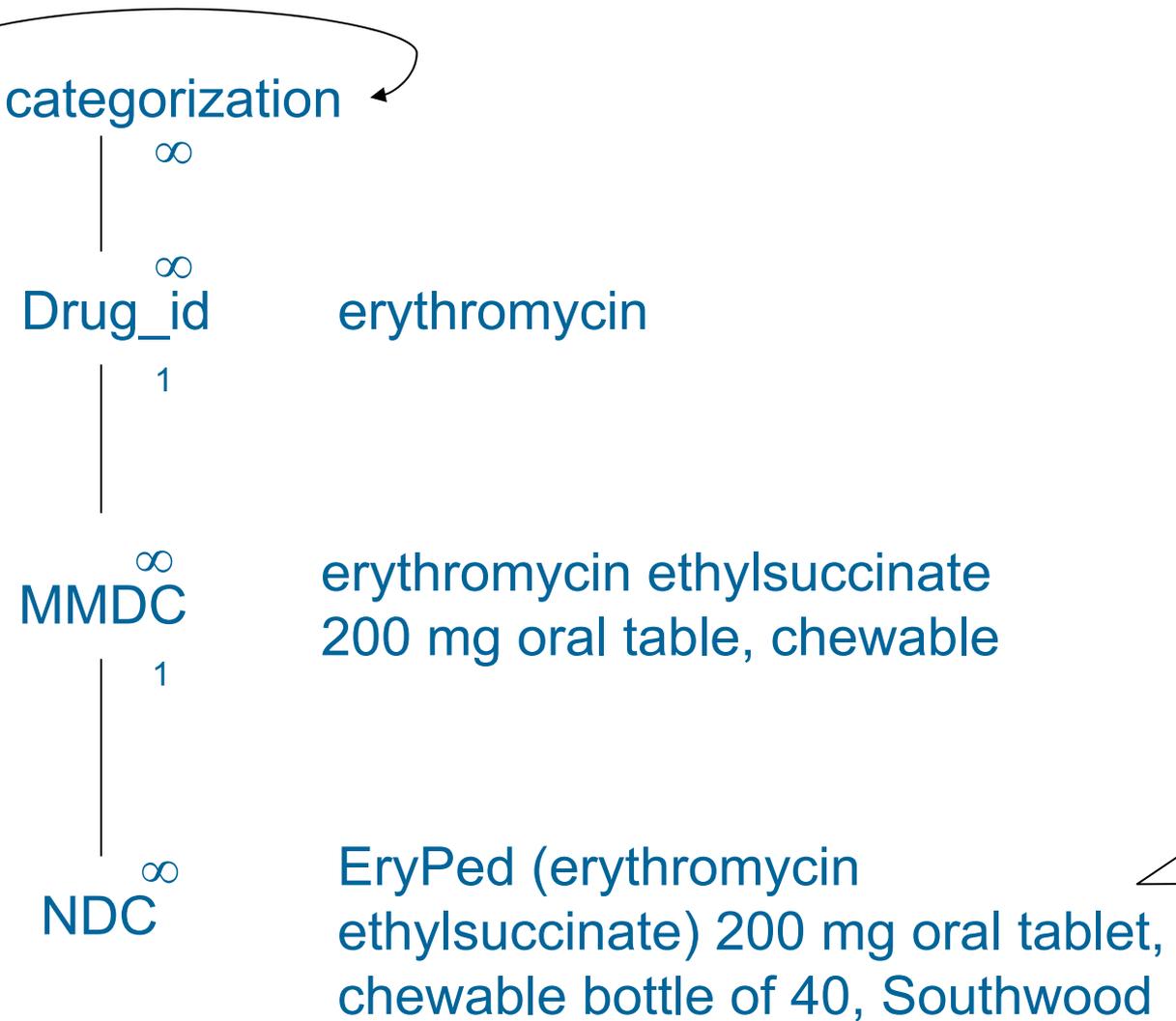
Lexical Foundation



- dose range check
- patient ed
- smart scripts
- CSA classification
- J-codes
- etc...



Lexical Foundation



- manufacturer
- packaging
- pricing
- images
- order sentences
- obsolescence
- etc...



Comparison

Multum Lexicon

- 17 tables
- Minimal data set
- Available under no-fee license agreement, downloadable on the web
- > 5700 licensees

Vantage Rx Database

- 144 tables
- Everything in the Multum Lexicon, and a lot more
 - Update tables/change dates
 - Expanded synonymy
 - Clinical content (referential information, DUR alerts, etc....)
- Available under a for-fee license
- > 150 paying clients (not including Cerner clients)



Multum Today

Content Adopted by Cerner Clients and More than 150 Additional Prestigious Organizations

– EMR/HIS Suppliers

- Eclipsys
- EPIC
- Electronic Healthcare Systems

– Hospital Enterprises

- CareGroup
- Baylor Health System

– Pharmacy System Suppliers

- PDX
- PharmNet

– Web Portals

- WebMD
- HealthSouth.com
- DiscoveryHealth.com

– Resellers

- Adam
- Mosby
- Softwatch

– PBMs

- Medco Health



Multum Lexicon

Microsoft Access

Edit View Insert Tools Window Help



drug_mlt : Database

Open Design New

Objects		
Tables	icd_9	ndc_core_description
Queries	multum_combination_drug	ndc_denorm
Forms	multum_dose_form	ndc_ingredient_strength
Reports	multum_drug_id	ndc_main_multum_drug_code
Pages	multum_product_strength	ndc_orange_book
Macros	multum_route	ndc_pregnancy_category
Modules	multum_units	ndc_source
Groups	ndc_active_ingredient	
	ndc_active_ingredient_list	
	ndc_brand_name	



VantageRx Database

Microsoft Access - [VantageRx : Database]

File Edit View Insert Tools Window Help



Open Design New

- Objects
- Tables
- Queries
- Forms
- Reports
- Pages
- Macros
- Modules

Groups

Favorites

drc_denorm	ms_categories	multum_drug_modifier_upd	ndc_active_ingredient_list
drc_frequency_check	ms_categories_upd	multum_drug_name	ndc_active_ingredient_list_upd
drc_frequency_check_upd	ms_ndc_core_description	multum_drug_name_derivation	ndc_active_ingredient_upd
drc_mmdc_data	ms_ndc_core_description_upd	multum_drug_name_map	ndc_additional_description
drc_mmdc_data_upd	ms_ndc_cost	multum_drug_name_map_upd	ndc_additional_description_upd
drc_nomenclature	ms_ndc_cost_upd	multum_drug_name_upd	ndc_brand_name
drc_nomenclature_expression	multum_additional_doseform	multum_duplication_categories	ndc_brand_name_upd
drc_nomenclature_expression_upd	multum_additional_doseform_upd	multum_duplication_drug_xref	ndc_core_description
drc_nomenclature_upd	multum_category_drug_xref	multum_duplication_sub_xref	ndc_core_description_upd
drc_ranges	multum_category_drug_xref_upd	multum_flavor	ndc_cost
drc_ranges_upd	multum_category_sub_xref	multum_flavor_upd	ndc_cost_upd
drc_type	multum_category_sub_xref_upd	multum_frequency	ndc_denorm
drc_type_upd	multum_clinical_route	multum_frequency_multiplier	ndc_image
drug_leaflet_map	multum_clinical_route_upd	multum_frequency_upd	ndc_image_upd
ftd_additional_text	multum_color	multum_function_type	ndc_ingredient_strength
ftd_heading	multum_color_upd	multum_mmdc_name_map	ndc_ingredient_strength_upd
ftd_multum_condition	multum_combination_drug	multum_mmdc_name_map_upd	ndc_main_multum_drug_code
ftd_text	multum_combination_drug_upd	multum_product_route	ndc_main_multum_drug_code_upd
ftd_text_condition	multum_condition	multum_product_route_upd	ndc_orange_book
ftd_text_type	multum_condition_upd	multum_product_strength	ndc_orange_book_upd
hcfa_icd_9	multum_dose_form	multum_product_strength_upd	ndc_source
icd9_map	multum_dose_form_upd	multum_script_category	ndc_source_upd
icd9_map_upd	multum_drug_categories	multum_severity	ref_detail
icd_9	multum_drug_categories_upd	multum_shape	ref_drug
int_drug_interactions	multum_drug_id	multum_shape_upd	script_common
int_interaction_description	multum_drug_id_upd	multum_syst_id	script_common_denorm
label	multum_drug_modifier	multum_units	xp_clinical_text
label_drug_xref	multum_drug_modifier_map	multum_units_upd	xp_clinical_text_xref
leaflet	multum_drug_modifier_map_upd	ndc_active_ingredient	



PMRI Questionnaire

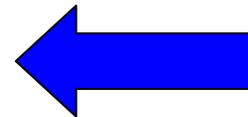
- **Multum was late in completing the NCVHS PMRI questionnaire mailed on 1/6/2003**
- **The questionnaire was addressed to a Multum associate who suffered an accident on 1/1/2003 requiring weeks of hospitalization, 5 surgeries, intensive care admission, and lengthy rehabilitation**
- **The questionnaire was placed in the associate's mailbox (unbeknownst to the associate or Multum management)**
- **When it was ultimately found, it was completed and returned urgently**
- **We apologize for our delinquency**



Questionnaire Evaluation

On July 22, 2003 we received notice from Steven Steindel, PhD that the Multum Lexicon failed to meet one of required four criteria:

- **Concept orientation**
- **Concept permanence**
- **Explicit version IDs**
- **Non-ambiguity**



Based on Multum responses to II_G, II_H, II_H1, III_D



Concept Permanence

We respectfully disagree with conclusion of the evaluation

- **Obsolete drugs and their identifiers are retained in the Multum Lexicon and VantageRx Database**
- **Obsolete drug products are explicitly marked as obsolete (with the date on which the drug products became obsolete)**
- **Obsolescence in the Multum system “trickles up” according specific rules (NDC to MMDC to drug_id to category id)**
- **Multum concept identifiers (i.e. NDC, MMDC, drug_id, etc...) are unique**
- **Multum concept identifiers (i.e. NDC, MMDC, drug_id, etc...) are not reused**
- **Multum concept identifiers (i.e. NDC, MMDC, drug_id, etc...) do not change in meaning (if there is a need to “change meaning”, a code is retired and a new concept code is added)**
- **Multum drug names are also explicitly marked as obsolete (but still retained)**
- **Record level controls exist for each modified record...and tables containing these controls are available to licensees of the Multum Lexicon and VantageRx Database for their inspection and use**



Concept Permanence

Baycol as a Simple Example



Baycol (cervistatin)

Microsoft Access - [multum_drug_id : Table]

File Edit View Insert Format Records Tools Window Help



drug_id	drug_name
04140	cerivastatin
03827	cetirizine
04764	cetirizine-pseudoephedrine
04706	cetorelix
03632	cetylpyridinium topical
04512	cevimeline
04409	chamomile
04494	chaparral
01028	charcoal
04244	charcoal-simethicone
04804	charcoal-sorbitol
00147	chloral hydrate
00188	chlorambucil
00025	chloramphenicol
03992	chloramphenicol ophthalmic
03991	chloramphenicol otic
03199	chloramphenicol topical
03890	chloramphenicol/fibrinolys/desoxyribo topical
03538	chloramphenicol/HC/polymyxin B ophthalmic
04073	chlorcyclizine topical
04074	chlorcyclizine-hydrocortisone topical
00189	chlordiazepoxide
03492	chlordiazepoxide-clidinium
01231	chlorhexidine topical
00909	chlormezanone
04195	chlorophyll
01328	chlorophyllin copper complex topical
01395	chloroprocaine
00035	chloroquine
00190	chlorothiazide
03778	chlorothiazide-methyldopa
03250	chlorothiazide-reserpine
00547	chlorotrianisene
01266	chloroxine topical

Record: 1 of 2309

Sheet View

Baycol (cervistatin)

Microsoft Access - [ndc_main_multum_drug_code : Table]

File Edit View Insert Format Records Tools Window Help



main_multum	principal_rout	dose_form_co	product_stren	drug_id	csa_schedule	j_code	j_code_descrip
6406	2426	2475	2658	d04140	0		
7025	2426	2475	2674	d04140	0		
6405	2426	2475	2635	d04140	0		
7748	2426	2475	2719	d04140	0		
8596	2426	2475	16455	d04141	0		
6437	2426	2475	7246	d04141	0		
6436	2426	2475	2959	d04141	0		
5612	2426	2475	3186	d04142	0		
8205	2426	2475	3724	d04143	0		
5962	2426	2475	3560	d04143	0		
5988	2426	2475	2611	d04145	0		
5991	2426	2475	2780	d04145	0		
5989	2426	2475	2645	d04145	0		
5990	2426	2475	2739	d04145	0		
6591	2426	2475	2685	d04145	0		
6057	2423	1086	1542	d04147	0		
6058	2423	1083	1542	d04147	0		
6006	2426	2440	3257	d04150	0		
3353	2430	2472	3138	d04151	0		
7047	2430	2472	3140	d04151	0		
6007	2426	1064	2788	d04152	3		
6009	2426	2475	7303	d04153	0		
6005	2426	2475	3694	d04154	0		
6008	2426	2475	3724	d04155	0		
6385	2426	2475	3146	d04156	0		
8527	2426	2475	3114	d04157	0		
6335	2426	2476	3114	d04157	0		
6292	2408	1073	2561	d04159	0		
6293	2421	1086	2494	d04159	0		
6294	2421	1086	7354	d04159	0		
6291	2426	2461	2552	d04159	0		
6295	2426	1086	3586	d04160	0		
8282	2426	2475	2776	d04160	0		
6296	2430	1140	3085	d04160	0		



Baychol (ML)

Microsoft Access - [ndc_denorm : Table]

File Edit View Insert Format Records Tools Window Help



ndc_code	brand_description	main_mu	route_des	dose_form	product_stren	drug_id	active_ingredi	strength_nu	strength_num	obsolete_date
4569458900	Baycol	6406	oral	tablet	0.3 mg	d04140	cerivastatin sod	0.3	milligram(s)	8/7/2001
4569486100	Baycol	7025	oral	tablet	0.4 mg	d04140	cerivastatin sod	0.4	milligram(s)	8/7/2001
0026288351	Baycol	6405	oral	tablet	0.2 mg	d04140	cerivastatin sod	0.2	milligram(s)	8/7/2001
0026288569	Baycol	7025	oral	tablet	0.4 mg	d04140	cerivastatin sod	0.4	milligram(s)	8/7/2001
0026288486	Baycol	6406	oral	tablet	0.3 mg	d04140	cerivastatin sod	0.3	milligram(s)	8/7/2001
0026288586	Baycol	7025	oral	tablet	0.4 mg	d04140	cerivastatin sod	0.4	milligram(s)	8/7/2001
0026288551	Baycol	7025	oral	tablet	0.4 mg	d04140	cerivastatin sod	0.4	milligram(s)	8/7/2001
0026288451	Baycol	6406	oral	tablet	0.3 mg	d04140	cerivastatin sod	0.3	milligram(s)	8/7/2001
0026288386	Baycol	6405	oral	tablet	0.2 mg	d04140	cerivastatin sod	0.2	milligram(s)	8/7/2001
0026288686	Baycol	7748	oral	tablet	0.8 mg	d04140	cerivastatin sod	0.8	milligram(s)	8/7/2001
0026288669	Baycol	7748	oral	tablet	0.8 mg	d04140	cerivastatin sod	0.8	milligram(s)	8/7/2001
2843010117	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843020233	Bayer Aspirin	5465	oral	tablet	500 mg	d00170	aspirin	500	milligram(s)	
2843020234	Bayer Aspirin	5465	oral	tablet	500 mg	d00170	aspirin	500	milligram(s)	
2843020235	Bayer Aspirin	5465	oral	tablet	500 mg	d00170	aspirin	500	milligram(s)	
2843010112	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843019188	Bayer Aspirin	5467	oral	tablet	650 mg	d00170	aspirin	650	milligram(s)	
2843033336	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843033337	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010118	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010110	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010106	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010239	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010220	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010181	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010120	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010113	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010238	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010111	Bayer Aspirin	5464	oral	tablet	325 mg	d00170	aspirin	325	milligram(s)	
2843010762	Bayer Aspirin PM Extr	6008	oral	tablet	500 mg-25 mg	d04155	aspirin	500	milligram(s)	
2843010762	Bayer Aspirin PM Extr	6008	oral	tablet	500 mg-25 mg	d04155	diphenhydramin	25	milligram(s)	
2843010960	Bayer Aspirin with Calc	8568	oral	tablet	buffered 81 mg	d00170	buffers	0	-	
2843010960	Bayer Aspirin with Calc	8568	oral	tablet	buffered 81 mg	d00170	aspirin	81	milligram(s)	
2843013105	Bayer Childrens Aspirin	5431	oral	tablet, che	81 mg	d00170	aspirin	81	milligram(s)	

Record: 15428 of 104874

Baycol (VRxDB)

Microsoft Access - [multum_drug_name : Table]

File Edit View Insert Format Records Tools Window Help



drug_s	drug_name	is_obsolete
11450	Baycol	T
16190	Baycol 0.2 mg oral tablet	T
16191	Baycol 0.3 mg oral tablet	T
31006	Baycol 0.4 mg oral tablet	T
37922	Baycol 0.8 mg oral tablet	T
7624	Bayer Aspirin	F
20064	Bayer Aspirin 325 mg oral tablet	F
20065	Bayer Aspirin 500 mg oral tablet	F
20066	Bayer Aspirin 650 mg oral tablet	F
10377	Bayer Aspirin PM Extra Strength	F
28151	Bayer Aspirin PM Extra Strength 500 mg-25	F
42805	Bayer Aspirin with Calcium	F
42923	Bayer Aspirin with Calcium 81 mg oral tablet	F
7560	Bayer Childrens Aspirin	F
27050	Bayer Childrens Aspirin 81 mg oral tablet, ch	F
7561	Bayer Low Strength	F
21869	Bayer Low Strength 81 mg oral tablet	F
7563	Bayer Plus	F
18568	Bayer Plus 500 mg oral tablet	F
7344	Bayer Select	F
8307	Bayer Select Backache Pain Formula	F
27531	Bayer Select Backache Pain Formula 600 m	F
10147	Bayer Select Decongestant	F
26717	Bayer Select Decongestant oral tablet	F
4972	Bayer Select Max Strength Night Time Pain	F
29048	Bayer Select Max Strength Night Time Pain	F
5024	Bayer Select Sinus Pain Formula	F
28152	Bayer Select Sinus Pain Formula oral tablet	F
30993	Baygam	F
31009	Baygam - injectable solution	T
44447	Baygam intramuscular solution	F
6238	Bayhep B	F
20579	Bayhep B intramuscular solution	F
6448	Bayrab	F

rd: 1 of 32629

Sheet View

Baycol (VRxDB)

Microsoft Access - [multum_drug_name : Table]

File Edit View Insert Format Records Tools Window Help



drug_s	drug_name	is_obsolete
13694	cerivastatin	T
19830	cerivastatin 0.2 mg oral tablet	T
19831	cerivastatin 0.3 mg oral tablet	T
31012	cerivastatin 0.4 mg oral tablet	T
37900	cerivastatin 0.8 mg oral tablet	T
14012	Cernevit	F
30410	Cernevit Multiple Vitamins intravenous solution	F
41645	Cernevit-12	F
41767	Cernevit-12 Multiple Vitamins intravenous solution	F
15251	Cerose DM	F
24478	Cerose DM oral liquid	F
10228	Cerovite Advanced Formula	F
30793	Cerovite Advanced Formula oral tablet	F
11589	Cerovite Junior	F
30700	Cerovite Junior oral tablet, chewable	F
10370	Cerovite Liquid	F
30581	Cerovite Liquid oral	F
10371	Cerovite Senior	F
30725	Cerovite Senior oral tablet	F
19985	Certagen	F
30499	Certagen oral liquid	F
30635	Certagen oral tablet	F
10333	Certagen Senior	F
30726	Certagen Senior oral tablet	F
40536	Certagen Senior with Lutein	F
40537	Certagen with Lutein	F
18502	Certavite	F
19984	Certa-Vite	F
30518	Certavite oral liquid	F
30651	Certa-Vite oral tablet	F
41646	Certiva	F
41806	Certiva intramuscular suspension	F
1130	Cerubidine	F
26427	Cerubidine 20 mg injection	F

Record: 1 of 32629

Worksheet View



Concept Permanence

- **We believe the Multum Lexicon provides an excellent example of concept permanence in a large-scale health terminology system**
- **We are asking the committee to reconsider its findings regarding concept permanence and the Multum Lexicon**



A Proposal



Background

- For years Cerner has publicly advocated the creation of a central code-assigning authority for drugs and drug products.
- We believe the continued use of disparate, generally proprietary, drug terminology systems is a potential threat to the safety of individual patients and to the public health **AND** limits the ability of care providers, payers, and others to perform their work efficiently, effectively, and safely.
- For the same general reasons the Federal government is sponsoring and subsidizing use of SNOMED-CT, we believe that the Federal government (FDA) should establish and maintain drug terminology standards and code sets.



Assumptions

- **Creation of a drug terminology standard is expensive and time consuming.**
- **Multiple well-developed drug terminology systems exist.**
- **FDA should profit from the experience of commercial vendors of drug information systems and select one as a starting point.**



Our Proposal

- **FDA should invite proprietary drug information providers to contribute drug terminology data in an open-source fashion.**
- **Cerner will make the complete VantageRx Database available for evaluation by FDA (or other appropriate Federal agency).**
- **FDA may determine what tables, fields, and data etc... it may need in order to achieve the goal of creating a national drug terminology standard and code set.**
- **Cerner will provide to FDA any tables, fields, and data selected by FDA for use by the FDA and US public under a “liberal open-source agreement”*.**

***unlimited right for FDA to distribute, redistribute, use, and modify data**



Benefits of Proposal

- **Creates a fast-track and low-cost path to a comprehensive national standard.**
- **Encourages multiple vendors to participate and contribute to a standard code set via an open, transparent process.**
- **Facilitates interoperability (all drug vendors will have access to the selected data).**